

Assessment of Soil, Water and Riparian Resources on the Gila National Forest



Nessa Natharius, APSS
Soil Scientist and Watershed Specialist
USDA Forest Service-Gila National Forest



Key Ecosystem Characteristics, System Drivers and Stressors

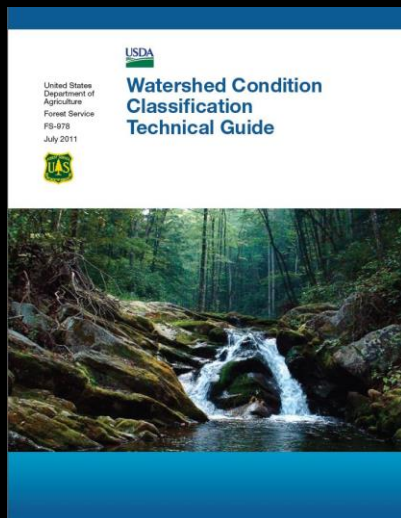
Vegetative Groundcover	Climate
Ecological Status	Climate Change
Soil Organic Carbon	Flood Frequency
Soil Loss	Water Uses and Demands
Soil Condition	Wildfire and Managed Fire
Watershed Condition	Timber/Fuelwood Harvesting
Water Quality	PJ Encroachment and Removal
Extent and Distribution of Perennial and Intermittent Streams, Springs/Seeps, and Wetlands	Invasive Species
Streamflow	Insects and Disease
Riparian Condition	Pesticide Use
	Mining
	Herbivory
	Roads and Trails

Watershed Condition

Water Quality
Water Quantity
Aquatic Habitat
Aquatic Biota
Riparian/Wetland
Vegetation
Soil Conditions

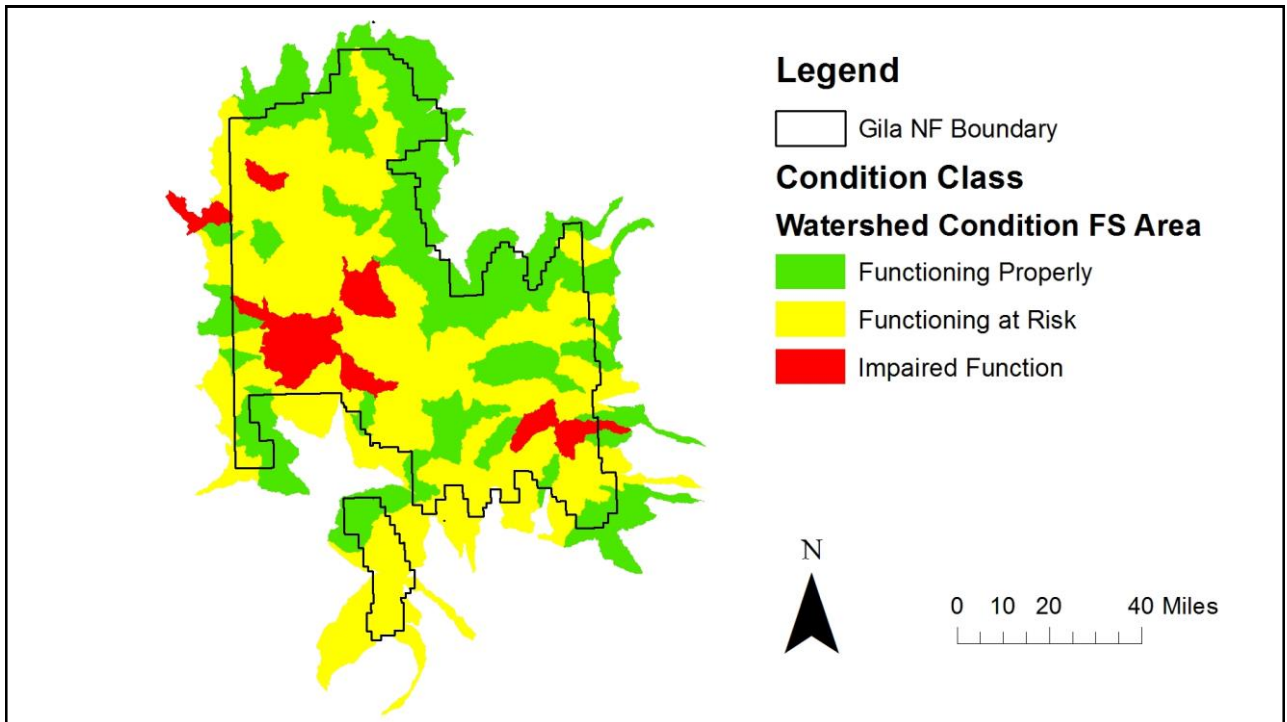
Roads and Trails
Fire Regime/Wildfire
Effects
Forest Cover
Forest Health
Terrestrial Invasive
Species
Rangeland Vegetation
Condition

Watershed Condition



- Functioning Properly
- Functioning at Risk
- Impaired Function

http://www.fs.fed.us/sites/default/files/media/types/publication/field_pdf/watershed_classification_guide2011FS978_0.pdf



Watershed Condition

Water Quality
 Water Quantity
 Aquatic Habitat
 Aquatic Biota
 Riparian/Wetland
 Vegetation
 Soil Conditions

Roads and Trails
 Fire Regime/Wildfire
 Effects
 Forest Cover
 Forest Health
 Terrestrial Invasive
 Species
 Rangeland Vegetation
 Condition

Extent and Distribution of Perennial and Intermittent Streams



Rain Creek
Photo courtesy of Kristina Deem

Representativeness and Redundancy Analysis

Representativeness

Outlet East Fork Gila River Watershed (5th code)

Index

$$0.94 / 0.99 = 0.9$$

Representative

Redundancy



Not Redundant

Streamflow Characteristic



San Francisco River Upstream of Confluence with Big Dry Creek

Mean Annual Flow

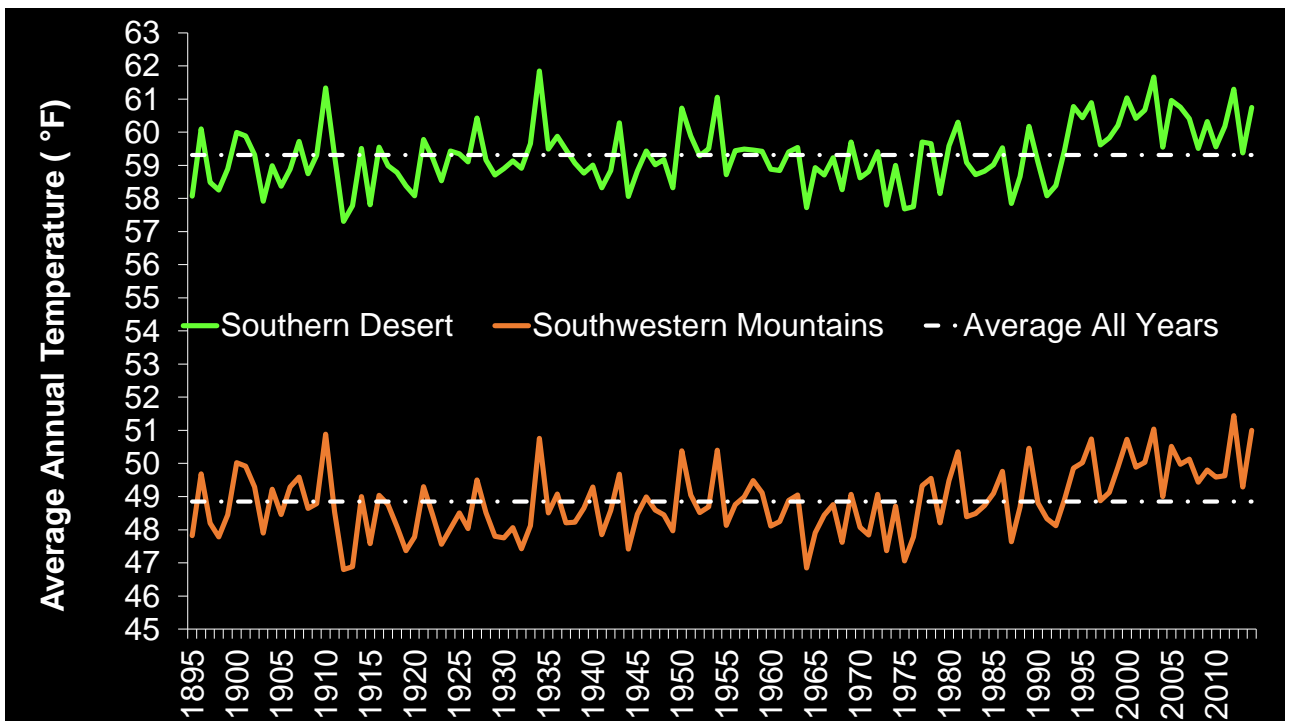
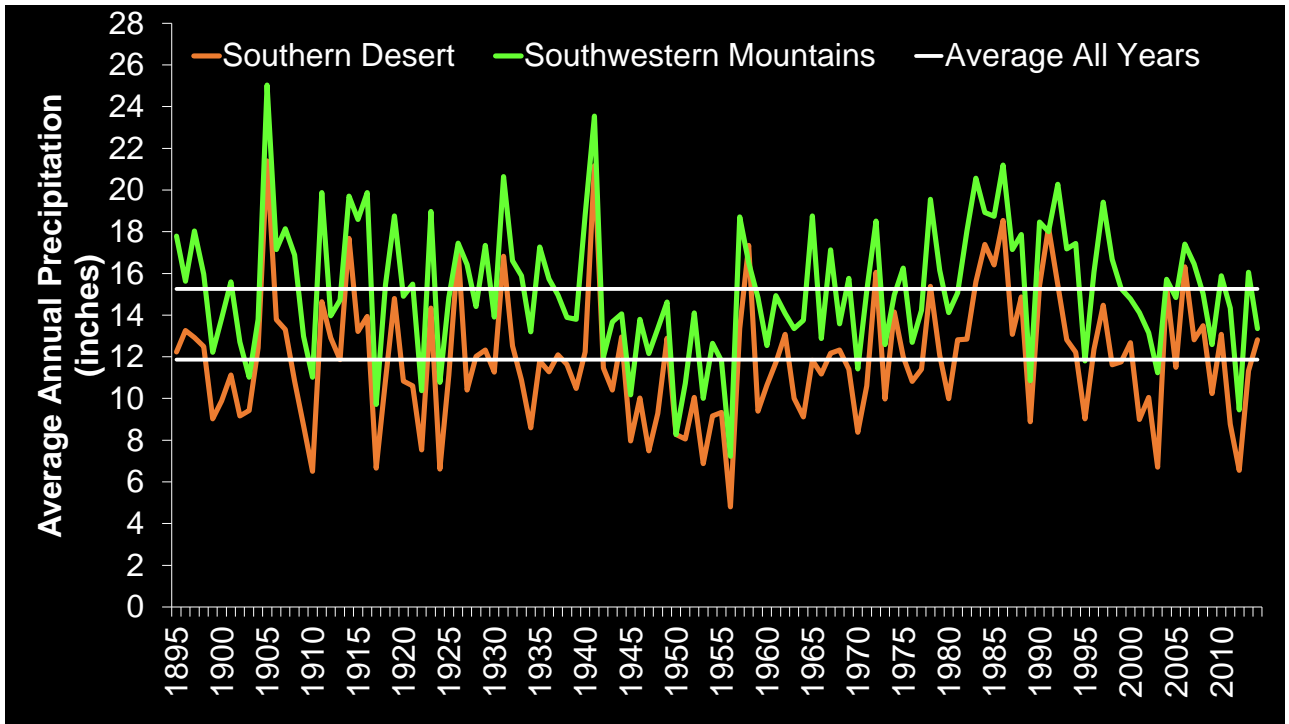
Median Annual Flow

Mean Monthly Flow

High Flow Days

Low Flow Days

Reference Time Period?



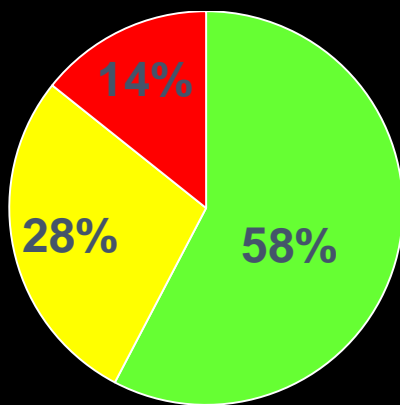
Streamflow Characteristic



Little Cherry Creek
Photo courtesy of Kristina Deem

- Characterize Flow = Entire Period of Record
- Reference Time Period = pre-1990
- Current Time Period = post-1990
- Trend = Compare Subsets of Current

Water Quantity Indicator



- Functioning Properly
- Functioning at Risk
- Impaired Function

Alterations to hydrograph due to water diversions, water controls or “significant” wildfire

Riparian Resource Characteristics

1. Function
2. Flood Frequency
3. Vegetative Groundcover
4. Ecological Status



San Francisco River Upstream of Big Dry Creek

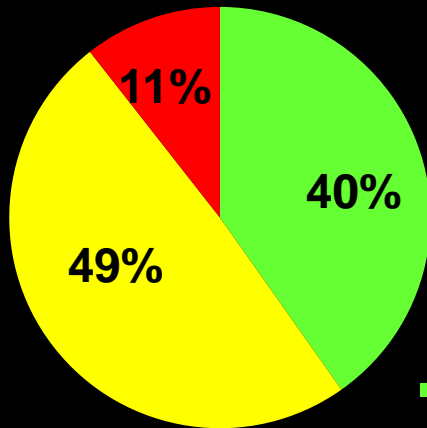
Riparian/Wetland Vegetation and Aquatic Habitat Indicators

- Vegetation Condition
- Channel Shape and Function
- Habitat Fragmentation
- Large Woody Debris



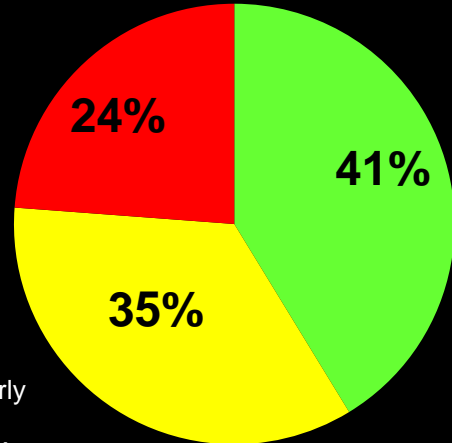
Whitewater Creek upstream of South Fork

Riparian/Wetland Vegetation Indicator

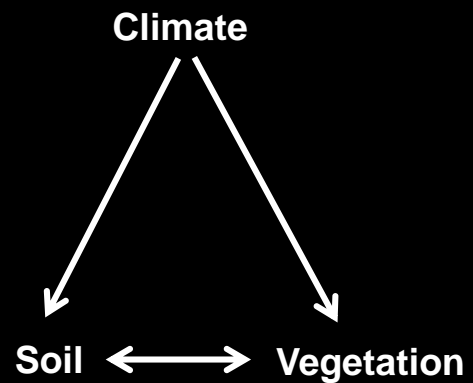
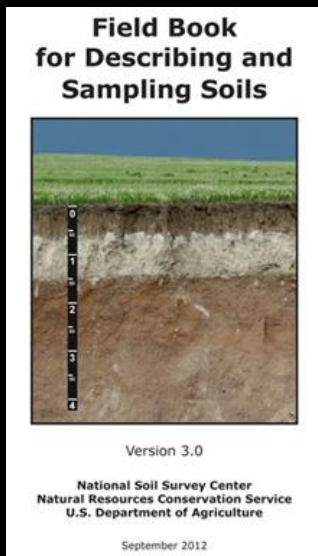


- Functioning Properly
- Functioning at Risk
- Impaired Function

Aquatic Habitat Indicator

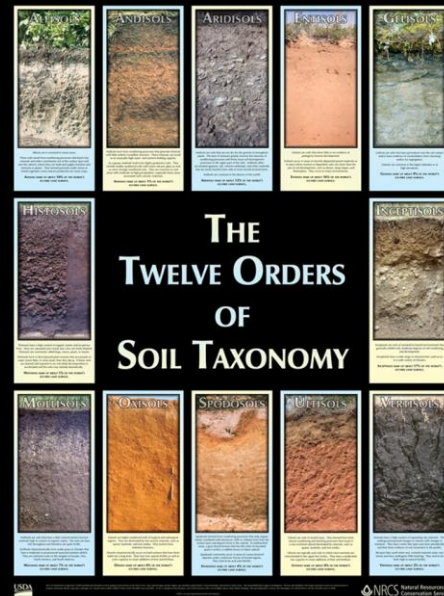


Terrestrial Ecological Unit Inventory



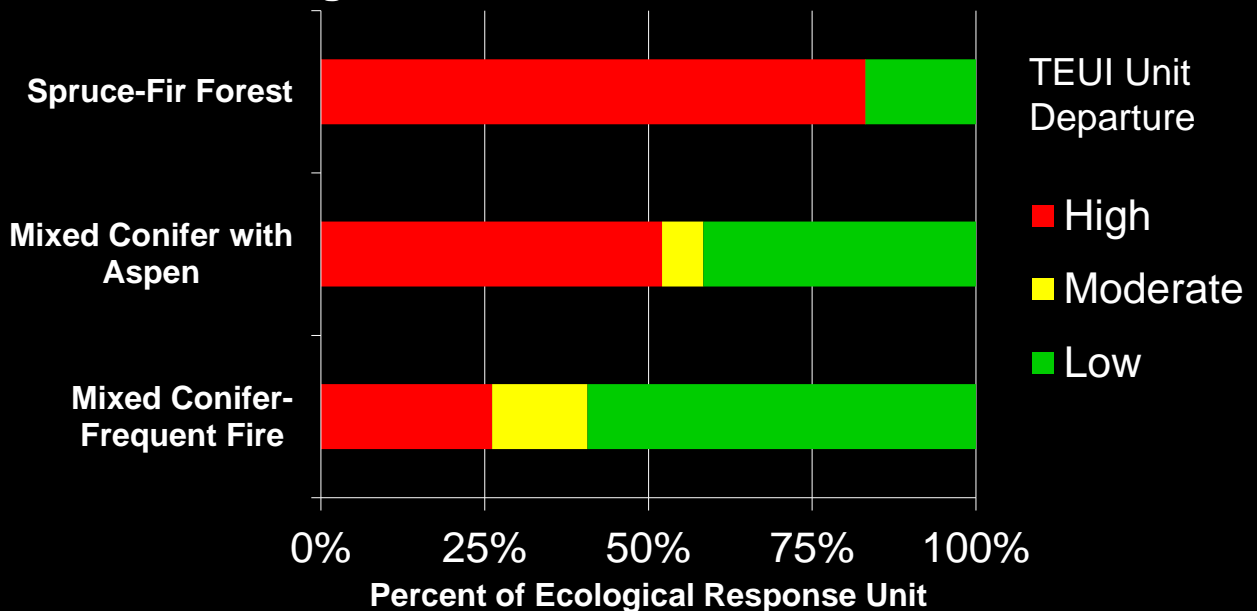
Soil Resource Characteristics

1. Diversity and Distribution
2. Soil Condition
3. Soil Loss
4. Vegetative Groundcover
5. Ecological Status
6. Soil Organic Carbon



http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_053588

Vegetative Groundcover Characteristic



System Drivers

Predominate Climate Regime

Ecological Processes

Disturbance Regimes

and Stressors

Climate Change

Altered Ecological Processes

Altered Disturbance Regimes

Departure from Reference Condition	Major Stressor(s)?	TREND		
		Toward Reference	Stable or Not Apparent	Away from Reference
Significant Departure (Moderate and High)	No	Risk Addressed	Legacy of Past Management OR Due to Current Management?	Potential for High Risk
	Yes	Potential Risk	Potential High Risk	Likely High Risk
No Significant Departure (Low)	No	No Risk	No Risk	Potential Risk
	Yes	Potential Risk	Potential Risk	Potential for High Risk

“None of us is as smart as all of us” – Japanese proverb

Brian Park – Gila National Forest GIS Program Manager

Jack Triepke – Regional Ecologist and Air Program Manager

Nori Koehler – Terrestrial Ecological Unit Inventory NM Zone Soil Scientist

Micah Kiesow - Terrestrial Ecological Unit Inventory NM Zone Soil Scientist

Steve Strenger –Terrestrial Ecological Unit Inventory NM Zone Supervisory Soil Scientist

Michael Natharius – Gila National Forest Soil Scientist

Carolyn Koury – Gila National Forest Hydrologist and Watershed Program Manager

Matthew Schultz – Gila National Forest Planner

Mitchel White – Gila National Forest Plan Revision Ecologist

Rene Guaderrama – Gila National Forest Plan Revision Biologist